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In re Application of

Application Number

09/063924

Filed

April 22, 1998

Paper No. #12

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Darlene Jones

Signature

Darlene Jones

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703-418-0330

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United States Patent

[19]

Benini

[11] Patent Number:

6,090,178

[45] Date of Patent:

Jul. 18, 2000

[54] FRANGIBLE METAL BULLETS,
AMMUNITION AND METHOD OF MAKING
SUCH ARTICLES

[75] Inventor: Joseph C. Benini, Kersey, Pa.

[73] Assignee: SinterFire, Inc., Kersey, Pa.

[21] Appl. No.: 09/186,366

[22] Filed: Nov. 5, 1998

Related U.S. Application Data

[62] Division of application No. 09/063,924, Apr. 22, 1998;
abandoned.

[51] Int. Cl.⁷ B22F 3/02

[52] U.S. Cl. 75/245; 75/247; 102/517;
419/2; 419/44

[58] Field of Search 75/245, 246, 247;
419/44; 102/517

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5,679,920 10/1997 Hallis et al. 102/506

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SCM Metal Products, Inc. Brochure, "Premixed Bronze
Powders for P/M Bearings," (1996).

Primary Examiner—Ngoclan Mai
Attorney, Agent, or Firm—Finnegan, Henderson, Farabow,
Garrett & Dunner, LLP

ABSTRACT

[57] A frangible metal bullet, a method for making it, and ammunition made therefrom. The frangible metal bullet is formed from a mixture of metal particles and metal or metalloid binder forming material which is compacted into the desired shape, heated to a temperature above that needed to form at least one intermetallic compound but below the temperature of joining of the metal particles by sintering and below the temperature of formation of substantial amounts of a ductile alloy of the metal of the particles and the metal or metalloid binder forming material and then cooled. Such bullets have sufficient strength to maintain their integrity during firing but disintegrate into powder on impact and can be formulated to be lead-free.

23 Claims, 1 Drawing Sheet



US006090178A

United States Patent [19]**Benini**[11] **Patent Number:** **6,090,178**[45] **Date of Patent:** **Jul. 18, 2000**[54] **FRANGIBLE METAL BULLETS,
AMMUNITION AND METHOD OF MAKING
SUCH ARTICLES**[75] **Inventor:** **Joseph C. Benini, Kersey, Pa.**[73] **Assignee:** **SinterFire, Inc., Kersey, Pa.**[21] **Appl. No.:** **09/186,366**[22] **Filed:** **Nov. 5, 1998****Related U.S. Application Data**[62] Division of application No. 09/063,924, Apr. 22, 1998,
abandoned.[51] **Int. Cl.⁷** **B22F 3/02**[52] **U.S. Cl.** **75/245; 75/247; 102/517;
419/2; 419/44**[58] **Field of Search** **75/245, 246, 247;
419/44; 102/517**[56] **References Cited****U.S. PATENT DOCUMENTS**

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OTHER PUBLICATIONSSCM Metal Products, Inc. Brochure, "Premixed Bronze
Powders for P/M Bearings," (1996).*Primary Examiner*—Ngoclan Mai*Attorney, Agent, or Firm*—Finnegan, Henderson, Farabow,
Garrett & Dunner, LLP[57] **ABSTRACT**

A frangible metal bullet, a method for making it, and ammunition made therefrom. The frangible metal bullet is formed from a mixture of metal particles and metal or metalloid binder forming material which is compacted into the desired shape, heated to a temperature above that needed to form at least one intermetallic compound but below the temperature of joining of the metal particles by sintering and below the temperature of formation of substantial amounts of a ductile alloy of the metal of the particles and the metal or metalloid binder forming material and then cooled. Such bullets have sufficient strength to maintain their integrity during firing but disintegrate into powder on impact and can be formulated to be lead-free.

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United States Patent [19]

Benini

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[45] Date of Patent: Jul. 18, 2000

[54] FRANGIBLE METAL BULLETS,
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